

2. I have from time to time worked with three different kinds of Teak; with Vengay (*Pterocarpus Marsupium*); Babool (*Acacia Arabica*); Ebony (*Diospyros tomentosa*); Eyne (*Penipectra tomentosa*); Jack (*Artocarpus integrifolia*); Jamboo (*Mimosa xylocarpa*); Mhowa (*Bassia latifolia*); Mutti (*Terminalia Coriacea*); Pipul (*Ficus religiosa*); and with a few other Indian trees the botanical names of which I do not know.

Proceedings of the Madras Government, Revenue Department,
15th April 1872.

3. I have found from experience that the thicker the plank the less likely it is to warp, but I have never found it less likely to split. The thick plank seems as apt to split as the thin. My experience also goes entirely with Mr. Molesworth as expressed in his paragraph 2. The strength and other properties of timber vary in the same log and in the same tree at different stages of its growth. The wood in the centre of the log is more brittle than in any other part of its diameter, and that nearest to the sap is less stiff. It has been ascertained by direct experiment that the layers of wood which are situated at two-fifths from the centre, or three-fifths from the sap, are the strongest in mature trees. In immature trees the wood at the bottom of the tree is stronger than that at the top, and in trees which have passed the proper age, the wood at the bottom is more brittle than it is at the top. With these facts before me, and from what I have seen in working the trees above-named, I think no broad conclusion as to the connection of the tendency of wood to split with its density can be drawn. In fact, in working different timbers, one meets with most contradictory results as illustrated by Mr. Molesworth.

4. Cloven timber will certainly crack less and be stronger than sawn timber; obviously because the cleavage follows the direction of the grain of the wood, and keeps the fibres continuous, whereas in sawing the fibres (being often tortuous) are cut across, and become disconnected, so that the wood is weakened, and becomes more liable to split. On the other hand, the wastage is much greater in the cloven timber.

5. I believe that, first, in the felling of the tree certain rules should be observed. It has been ascertained in Europe by experiments that the wood is materially improved by barking the tree while standing in the Spring when the trees are in a state of vegetation, and by felling them rather early in the Winter when their vegetative powers are at rest. Evelyn states that "to make excellent boards and planks it is the advice of some that you should bark your trees in a fit season, and so let them stand naked a full year before the felling." But I believe Indian experience does not advocate this practice, at least in the case of oil-containing trees such as Teak. In some kinds of English trees (such as Alder, Beech, and some kinds of Oaks) Mid-summer appears to be the best time for felling. But Mr. Knowles is of opinion that Winter-felling is best, chiefly in consequence of the timber being less liable to split or twist in seasoning from the drying being more gradual when it is cut at that time of the year. For this reason from October to January would seem the best period for felling trees in India.

6. There seems a general opinion, both amongst the wood-cutters of South America and the Natives of this country, that trees should be felled during the last two quarters, or the wane of the moon. They believe that timber felled when the moon is in its first and second quarters is subject to worms, and will not be durable. They apply this belief particularly to the case of the bamboo, and it seems in this tree at least to be confirmed by experience.

7. The timber being felled, it is desirable, I believe, to square it by sawing off four slabs from the log, in order to give the air access to the wood, and hasten its drying, etc.; then to remove it from the forest to as dry a situation as can be found, so that the air may circulate freely round each piece, but not to expose it to the direct rays of the sun and wind. If the log is large enough, it may be sawn into quarters after a short period of very slow drying in the whole tree. The seasoning yard should be paved and well-drained and be kept free of all weeds, etc., and the timber should be supported on cast-iron bearers. It is also an advantage, I believe, to set the timber upright with the lower end raised a little from the ground. Mr. Molesworth's suggestion of the end of the log being pointed and laid on a piece of stone is, I should think, an excellent one.

8. Dr. Cleghorn recommends the dipping of the extremities of the log in shani (cow-dung and water); and Alberti says "ancient architects not only prevented the access of the scorching rays of the sun and the rude blast of wind, but also covered the surface with cow-dung to prevent the too sudden evaporation from the surface."

9. I believe the most important point to be attended to in the first seasoning of the log is to allow it to dry gradually. This seems to be the most certain means of giving durability to the timber by hardening those parts most likely to be acted on by heat and moisture. Too speedy a drying by the heat of the sun or by any artificial process produces a hard crust on the surface

Proceedings of the Madras Government, Revenue Department,
15th April 1872.

of the log which does not permit the moisture to freely evaporate from the interior, and is injurious to the wood.

10. Duhamel's experiments in France proved that scantlings dry quickest in an upright position, and that the upper end dries more rapidly than the lower one. It might, therefore, be well to place the logs not as Mr. Molesworth recommends, but with the butt (or thicker end) uppermost, so as to produce a more speedy and uniform seasoning of the whole log. The planks might be laid as illustrated by Mr. Molesworth.

11. Natural seasoning to fit timber for carpenter's work usually occupies, I believe, two years, for joiner's work about four years, but much longer periods are sometimes employed in Europe. If the log is properly seasoned, I think it is scarcely necessary to season the scantlings and planks.

12. The quantity of matter which ought to be evaporated varies, I believe, from one-fifth to two-fifths of the weight of the original timber.

13. In order to shorten the period of seasoning, the method best suited to India is, in my humble opinion, to immerse the timber wholly in water as soon as it is cut down, to turn it in the water every three or four days, and to leave it in the water for not longer than twelve days. It is then taken out and treated in the ordinary way. The time of seasoning is thus reduced by one half. The water-seasoning also renders the timber less liable to warp and crack, and seems to make it impervious to the attacks of worms or insects. I believe the Rangoon and Moulmein teak is always considered more seasoned than that produced in Mysore and the South of India. Perhaps one cause of this may be the water-seasoning; the former timbers get in their passage down the rivers to the sea.

14. The Natives of India, I believe, frequently fell a tree, cut it up at once into the required scantlings, throw them into a tank, imbedding them in the wet mud for four or five weeks, and after a couple of weeks drying, use them in their buildings.

15. The desiccating process advocated by Mr. Molesworth is, I believe, an admirable one, where it can be applied on a large scale and under proper supervision. But it must be more expensive than the water-process. Is it much more effective?

16. As you are aware, the Public Works Department has little or no direct voice in the seasoning of timber. The "hand-to-mouth" way in which most of our works are of necessity carried on makes it generally impossible for us to wait until the wood we are able to purchase is fully seasoned. We have, as the want arises, to go to the Forest Department, or to the local market to purchase what we can get at the time, to cut it up and use it at once. For this reason, I think, it would be a great boon to our department if some really serviceable and inexpensive plan of hastening the seasoning of the timber could be universally adopted. I find the Royal Engineers in England, who are situated in this way, very much as we are, adopt largely the kyanizing process, in order to obtain, as needed, rapidly seasoned timber.

17. The Forest Department with which we deal solely in this range do their best, and supply us with very fairly seasoned Teak and Vengay. But still I notice almost universally in all our buildings that have been up any length of time, the usual signs of unseasoned wood in shrinking planks, gaping joints, and splitting beams. The timber, however, which we use here, and which comes from the Seegore and Mudamalai forests, is not so much unseasoned as unsound. The logs are full of holes, shakes, and cracks, often undiscernible from the exterior. It is very difficult to obtain from them serviceable planks or sound beams. The wastage is something terrible. The neat wood ultimately obtained seems tough and good, but it can only be obtained at an enormous cost. The wastage is generally fifty per cent. of the original beam, and in some cases much more.

18. I will not enter into the subject of the preservation of the timber, although it is a subject which comes more directly in the way of our department; but I beg to be allowed to quote the following process which has been used with the best results for the prevention of decay in wood. It is impervious to water. It is composed of fifty parts of tar, five hundred parts of fine white sand, four parts of linseed oil, one part of the red oxide of copper in its native state, and finally, one

*Proceedings of the Madras Government, Revenue Department,
15th April 1872.*

part of sulphuric acid. To manufacture the paint, the tar, chalk, sand, and oil are first heated in an iron kettle, the oxide and acid are then added with caution. The mass is very carefully mixed and applied while hot. When quite dry, the paint is as hard as stone. This process is, of course, only applicable to fully seasoned timber.

19. Apologising for the length of these remarks, I have, etc.

ENCLOSURE No. 2.

From G. H. PRINGLE, Esq., Assistant Engineer, to the Superintending Engineer, 7th Division, dated Mangalore, 8th January 1872, No. 530.

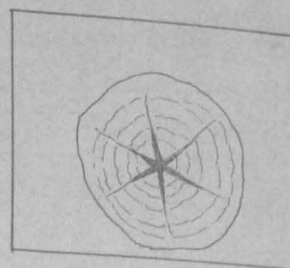
With reference to your endorsement on G. O., Public Works Department, No. 23, dated 6th December 1871, I have the honour to report on the seasoning of timber so far as I can add to the memorandum of Mr. Molesworth, with whose views I entirely concur.

2. Artificial seasoning, such as desiccation, etc., on account of expense and want of facilities cannot be taken into consideration on this coast.

3. The method employed both in England and Australia of ensuring a minimum of sap in the tree when felled might, I think, be advantageously introduced into this country. During the Spring, when the sap is running, trees are ringed, i.e., about 6 inches width of bark is cut off all round, and after the budding and throwing out of the summer foliage, when the leaves begin to show signs of withering, the tree is felled.

4. The submersion of freshly felled timber for two or three weeks in running water is, I think, desirable, as the gelatinous portions of fibre—those most liable to breed decay—are easily soluble; and though their loss robs the timber of a certain amount of toughness, the gain in durability is more than an equivalent, and there is less chance of that most fertile source of rot—fungoid growth—attacking the timber.

5. Logs should invariably be squared as soon as felled; a section of the soundest tree left in the round will soon exhibit cracks, radiating from the heart towards the sap-wood, losing themselves before they reach the circumference. In some trees, smaller cracks in the direction of the rings of the wood can be seen; and these cracks also increase in width with their approach to the heart. From whatever cause these cracks may arise, whether from the denser portions of the wood losing their moisture, and shrinking sooner than the more vesicular sap-wood, or whether after felling, the latter draws off gelatinous or watery matter from the heart-wood, it is certain that the removal of the sap-wood mitigates the evil considerably.



6. Timber should, in a damp climate like the West Coast, be removed from the jungle as soon as possible, placed under sheds, and raised off the ground by means of stones, to save it from vegetable growth as far as possible.

7. December to March is the best time for felling operations; most trees throwing out a large amount of leaf about November, and thus expending the sap secreted during wet weather.

8. I would not advise the use of any timber sooner than a-twelve month after the date of felling, though doubtless seasoning is a speedier matter in India than in England.

9. The direct action of the land-wind of seasoning timber should be avoided; its great drying powers acting on one side of a log must tend to split it.

10. Steaming timber is stated to entirely prevent dry rot, (*vide* Article on that subject in *Encyclopedia Britannica*). In the case of small scantlings, this plan might possibly be carried out.

*Proceedings of the Madras Government, Revenue Department,
15th April 1872.*

ENCLOSURE No. 3.

From Supervisor J. NICHOLSON, to the Superintending Engineer, 7th Division, dated Caroor, 9th January 1872, No. 168.

With reference to endorsement on G. O. No. 23 of 6th December 1871, I beg to state that I have had little experience in the seasoning of timber for building purposes. My experience leads me to think that it is not so much the want of a system for seasoning timber, as it is the difficulty of procuring any but timber in a green state.

2. Trees cut in the jungle and piled under shade, with a free draught of air passing through the pile, will season in twelve to eighteen months. These logs will then be ready for cutting into scantling, and if planks, they should be placed in stacks as shown in the diagram B. of the G. O., but under a covered shed, the two ends being open.

3. Planks of great breadth have a tendency to warp and split; such planks should be cut into one or more strips.

TRANSFERRED to the Revenue Department.

(Signed) J. CARPENDALE, Colonel, R.E.,
Secretary to Government, P.W.D.

(True Copy.)

(Signed) W. HUDLESTON,
Officiating Chief Secretary.

Ed. F. R. Bantleman.

REVENUE DEPARTMENT,
FORT ST. GEORGE,
1 April 1872.

No. 130.

No. 601

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
DEPARTMENT OF AGRICULTURE,
REVENUE, AND COMMERCE.

Forests, No. 4.

* Acting Superintending Engineer, 7th Division.
Captain Morant, Executive Engineer, do.
Mr. Pringle, Assistant do.
Mr. Nicholson, Supervisor, do.

SIR,—In continuation of my letter dated 27th March 1872, No. 536, I am directed to forward herewith the marginally noted reports* from officers of the Public Works Department, relative to the subject of seasoning planks and timber generally. Further reports will be transmitted as received.

I have the honour to be,

Sir,

Your most obedient servant,

(Signed) W. HUDLESTON,
Officiating Chief Secretary.

Ed. F. R. Bantleman

No 278

Supy. Engineer's Office 7th Dⁿ
Coimbatore 21st March 1872.

From,

St. Coll. W. Farewell S. C.

Ag. Supy. Eng^r 7th Dⁿ

To,

The Secretary to Government

S. P. W. Madras

Sir,

In reply to P. W. G. O. No 23 dated 6th December 1871, endorsed on Rev. Dept. G. O. No 1960 of 17th November 1871 and the papers printed therewith in reference to the seasoning of timber, I have the honor to enclose 3 reports from Range Officers of this Division on the subject, and further to add that in my opinion the first and foremost point to be considered is, the age of the timber felled. If only matured trees were felled, I feel sure, we would have far less anxiety about cracking and stacking and seasoning; and I do not believe any amount of trouble taken with immatured timber will tend to preserve it.

2. In regard to planks, my own experience is that planks should never be more than 6 inches wide, and not less than 1 1/2 inches thick; the mode of stacking proposed by Mr. Molesworth provided such is

+ No 213 of 6th Jan'y.
1872 from Capt. A.
Moorant.
No 530 of 8th Jan'y.
1872 from Mr.
Pringle.
No 168 of 9th Jan'y.
1872 from Mr.
Superintendent Nicholson.

under cover, I think good - I have found
soaking planks in pits filled with water,
keeping them well under water for a month,
and stacking them afterwards to dry under
cover, answer well in the case of ordinary
Junglewood & scaffolding planks; but for
Teakwood such is not necessary - Forced
seasoning, necessarily a most expensive
process, under any circumstances I think
should be avoided; mere "Keanizing"
matured timber answers well in the low
country to keep off the white ants which
however seldom touch Indian teak, though
they attack shoulmein teak generally sup-
posed to be deprived of its oil. I have
successfully used a mixture of one lb
of Asphalt to six lbs of Tar for preserving
timber placed in contact with the ground
or masonry from damp and white ants.

3. On the Western Coast the
general impression is that timber that
has been rafted by sea and thus for a
time immersed in salt water is always
liable to crack and decay.

I have the honor to be
Sir,

Your most obedt servant

Whitcomb & Co. Secy.
By Supy Supt J. S.

N.P.

[Faint handwritten notes and signatures on a separate sheet of paper, including the name "Whitcomb & Co." and various illegible scribbles.]

P. W. 1872 Depart.

No 1511.

From,

The Supt Engineer
7th Division

To The Secretary to Govt
D. P. W. Madras

No 278

Dated 27th

R. 26 } March 1/72

Enclosures 3

Reports in reference
to the seasoning of timber

sent to Supt
in copy
Transferred

Encl

Transferred to
the Revenue Dept

Appendals Col RR
Sey No 170
MD

27th March 1/72

Rev: 1872: Dept:
N. 1085.

From
Sey to Gov?
O. W. D.

Dated 27th } March/72
Recd 28th }

Enc: 3.

Transferring certain
reports from Profy Sup?
7th Dr in reference to
the seasoning of timbers

A. L. No 601-15 April
72

No 213

Executive Engineer's Office
En. D. P. Volcanario 6th Jan^y 1872

From

Captain J. H. L. Mount. R.E.
Executive Engineer
Philippines

To

Lieut. Colonel W. Fairall S.C.
Adj. Superintendent Engineer
7th Division

Sir

With reference to your endorsement
of the 14th ultimo on G. O. No 23 of the
6th Decr. S. W. P. giving course to the
two memoranda by the Officiating
Inspector General of timbers and
by the Consulting Engineer for
State Railways, I have the honor
to submit my views on the subject
of seasoning planks and timbers -
generally

2. I have from time to time
worked

worked with three different kinds of
Grain.

With Vengay (*Strocarpus Marsupium*)

" Balool (*Acacia Arabica*)

" Ebony (*Diospyros tomentosa*)

" Cyne (*Dactyloctenium aegyptium*)

" Jack (*Artocarpus integrifolia*)

" Jambro (*Simosa xylocarpa*)

" Mbow (*Bassia latifolia*)

" Nutli (*Terminalia Coridara*)

" Pipul (*Ficus religiosa*)

and with a few other Indian trees
the Botanical names of which I
do not know.

3. I have found from experience
that the thicker the plank the less likely
it is to split, but I have also found it less likely
to split. The thick plank serves as
apt to split as the thin. My experience
also goes entirely with Mr. Holmsworth
as expressed in his para: 2. The strength
and other properties of timber vary
in the same log and in the same
tree at different stages of its growth.
The wood in the centre of the log is
more brittle than in any other part
of its diameter, and that nearest
to the sap is less stiff. It has been
ascertained by direct experiment
that the layers of wood which are

situated at $\frac{2}{5}$ from the centre or
 $\frac{3}{5}$ from the sap are the strongest in
mature trees. In immature trees
the wood at the bottom of the tree is
stronger than that at the top, and
in trees which have passed the proper
age the wood at the bottom is
more brittle than it is at the top. With
these facts before me and from what
I have seen in working the trees in
about 1840, I think no broad con-
clusion as to the connection of
the tendency of wood to split with
its density can be drawn. In fact
in working different timbers our
results with most contradictory
results as illustrated by Mr. Holms-
worth.

4. Churn timber will certainly
crackles and be stronger than sawn
timber obviously because the cleavage
follows the direction of the grain
of the wood and keeps the fibres con-
tinuous, whereas in sawing the
fibres (being of this tortuous) are cut
across and become disconnected
so that the wood is weakened
and becomes more liable to
split. On the other hand the sawn
is

is much greater in the chosen timber.

5. I believe that first in the felling of the tree certain rules should be observed. It has been ascertained in Europe by experiments that the wood is materially improved by harking the tree while standing in the Spring when the trees are in a state of vegetation; and by felling them rather early in the Winter, when their vegetative powers are at rest. Evelyn states that "to make excellent boards and planks it is the advice of some you should bark your trees in a fit season and so let them stand naked a full year before the felling." But I believe Indian experience does not advocate this practice at least in the case of oil-containing trees such as Oak. In some kinds of English trees (such as Alder, Birch, and some kinds of Oaks) indeed it appears to be the best time for felling. But Mr. Knowles is of opinion that winter felling is best chiefly in consequence of the timbers being less liable to split or twist in seasoning from

the drying being more gradual when it is cut at that time of the year. For this reason from October to January would seem the best period for felling trees in India.

6. There seems a general opinion both amongst the wood cutters of South America and the Indians of this country that trees should be felled during the last two quarters of the moon. They believe that timber felled when the moon is in its first and second quarters is subject to worms and will not be durable. They apply this belief particularly to the case of the Bamboo, and it prevails in this tree at least to the confusion of experience.

7. The timber being felled, it is desirable, I believe to square it by sawing off four sides from the log in order to give the air access to the wood and hasten its drying. Then to remove it from the forest to as dry a situation as can be found so that the air may circulate freely round each piece but not to expose it to the direct rays of the Sun and Wind. If the log

133-134
is large enough it may be sawn
into quarters after a short period
of slow drying in the whole tree.
The seasoning yard should be
paved and well drained and be
kept free of all weeds &c. and the
timber should be supported on
cast iron bearers. It is also an
advantage, I believe, to set the timber
upright with the lower end raised
a little from the ground. Mr. Holm-
worth's suggestion of the end of the log
being pointed and laid on a piece
of stone is I should think an
excellent one.

8. Mr. Chyhorn recommends the
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rays of the sun and the rude blasts
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13. In order to shorten the period of seasoning, the method best suited to India is in my humble opinion to immerse the timber wholly in water as soon as it is cut down, to turn it in the water every 3 or 4 days and to leave it in the water for not longer than 12 days. It is then taken out and treated in the ordinary way. The time of seasoning is thus reduced by one half. The water seasoning also renders the timber less liable to warp and crack and seems to make it impervious to the attacks of worms or insects. I believe the Angkor and Siam timber is always considered more seasoned than that produced in Mysore and the South of India. Perhaps one cause of this may be the water seasoning the former timbers get in their passage down the Rivers to the Sea.



14. The Natives of India, I believe frequently fell a tree, cut it up at once into the required scantlings, throw them into a tank imbedding them in the wet mud for four or five weeks and after a couple of weeks drying use them in their buildings.

15. The desiccating process advocated by Mr. Halesworth is I believe an admirable one where it can be applied on a large scale and under proper supervision. But it must be more expensive than the water process. Is it much more effective?

16. As you are aware the P. & O. Department has little or no direct business in the seasoning of timber.

The "hard to mouth" way in which most of our works are of necessity carried on, make it generally impossible for us to wait until the wood we are able to purchase is sufficiently seasoned. We have as the usual advice to go to the Timber Department or to the local market to purchase what we can get at the time, to cut it up and use it.

it at once. For this reason, I think it would be a great boon to our Department if some really serviceable and inexpensive plan of hastening the seasoning of the timber, could be universally adopted. I find the Royal Engineers in England who are situated in this way very much as we ^{are}, adopt largely the ^{hydrolyzing} process, in order to obtain as needed rapidly seasoned timber.

17. The Forest Department with which we deal solely in this country, do their best and supply us with very fairly seasoned Teak and Pungay. But still I notice almost universally in all our buildings that have been up any length of time the usual signs of unseasoned wood in shrinking planks gaping joints and splitting beams. The timber however which we use here and which comes from the Sargoré and Budamalai forests is not so much unseasoned as unseasoned. The logs are full of holes, shakes and cracks of the

undiscernible from the exterior. It is very difficult to obtain from them serviceable planks or bowed beams. The wastage is something terrible. The great wood ultimately obtained serves tough and good but it can only be obtained at an enormous cost. The wastage is generally 50 per cent of the original beam, and in some cases much more.

18. I will not enter into the subject of the preservation of the timber, although it is a subject which comes most directly in the way of our Department. I beg to be allowed to quote the following process which has been used with the best results for the preservation of decay in wood. It is impervious to water. It is composed of 50 parts of tar, 500 parts of fine white sand, 4 parts of linseed oil, one part of the red oxide of Copper in its native state and finally one part of sulphuric acid. To manufacture the paint the tar, chalk, sand and oil are first heated in an iron kettle, the oxide and acid are then added.

Shave the honor to be
Sir
Your most obed^t servant
J. M. Morant.
Capt. R. E.
Lieutenant Engineer

$Q_{1/1085/72}$

Dear Sir,
 I have the honor to
 acknowledge the receipt
 of your letter of the
 10th inst. and in reply
 to inform you that
 the same has been
 forwarded to the
 proper authorities for
 their consideration.
 I am, Sir, very
 respectfully,
 Yours,
 J. M. Smith

P. M. 1571/72.

Dear Sir,
I have the honor to acknowledge the receipt of your letter of the 27th inst. in relation to the above named person, and in reply to inform you that the same has been forwarded to the proper authorities for their consideration. I am, Sir, very respectfully,
Yours, &c.

Sir,
With reference to endorsement on G. S.
No 23, of 6th December 1871, I beg to state
that, I have had little experience in the
seasoning of timber for building purposes,
my experience leads me to think that it
is not so much the want of a system
for seasoning timber, as it is the diffi-
culty of procuring any but timber
in a green state—

Trees cut in the jungle and piled under shade, with a free draught of air passing through the pile will season in 12 to 18 months. These logs will then be ready for cutting into scantling, and if planks they should be placed in stacks as shown in the diagram **B** of the G. C. but under a covered shed the two ends being open.

Planks of great breadth have a tendency to warp and split, such planks should be cut into one or more strips-

I have & co

Headquarters
Range Officer.

See letter from the
Deputy Engineer, 1872, in
the following to
Governor and C. P. W.
dated 21st March
1872, No 248 -

P. W. 15/11/72.

Various Ranges
of Forests in
the district
of Deccan
to be made & timber

Q-3
1085/12

7c Price
Sent 16 April 73

H-601-

15. April 72.

To

The Secretary to the Govt of India
Dept. of Agric. Res. Home
(Forests).

Sir,

In continuation
of my letter dated 27th March 1872
No 536, I am directed to

forward herewith, the marginally
*
As Superintending Engineer - 7th Div - listed reports from Officers of
Capt: Inorant &: Infr - 5 - the Public Works Department,
Mr Pringle Asst: 5 - 5 - relative to the subject of
Mr Nicholson Supervisor - 5 - seasoning planks and
timber generally - Further
reports will be transmitted
as received.

108